Name : Mansoor Jadoon

Id; 16637

Q# 1 (a) Ans:

Given:

temperature = 140°C

Solution:

As we know:

$K = {}^{\circ}C + 273$

putting value of 'C':

$^{\circ}K = 140 + 273$

$= 413$

$\boxed{^{\circ}K = 413}$

Ans:

$^{\circ}R = 1.8(K)$

putting value of 'K':

(2)

$°R = 1.8(413).$

$°R = \frac{18}{10}(413).$

$$\boxed{°R = 743.4}$$

And:

$°R = °F + 460.$

$°R - 460 = F$

$°F = °R - 460$

$°F = 743.4 - 460$

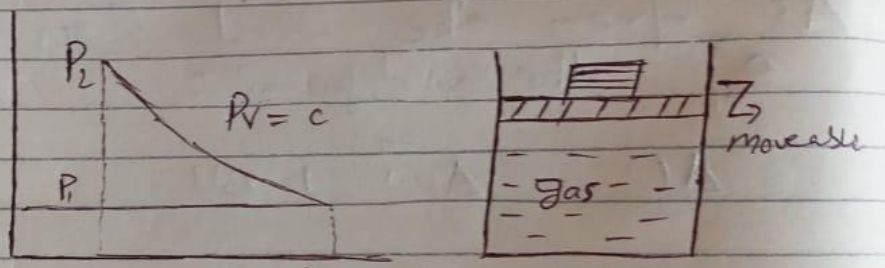
$$\boxed{°F = 283.4}$$

(2)

Q1 (b) Ans:

The process which is given in Q1 (b) is

"Isothermal process" in which temperature is constant.



(PV digram)

Mathematically:

$$W = \int_{V_1}^{V_2} P\,dV \rightarrow (i)$$

As:

$$P_1 V_1 = P_2 V_2 \Rightarrow PV = C \rightarrow (a)$$

$$P = C/V$$

(5)

equ (1) becomes:

$$W = \int_{V_1}^{V_2} c/V \, dV$$

$$= c \ln V \Big|_{V_1}^{V_2}$$

$$W = c \ln (V_2/V_1)$$

AS: $PV = C$

SO:

$$\boxed{W = P_1 V_1 \ln (V_2/V_1}$$

(5)

(3) (5)

Q#2 (b) Ans:

Process 1 → isochoric

Process 2 → Adiabatic

Process 3 → isothermal

Process 4 → isobaric.

(3) (5)

(6)

Q# (3) (i). Ans:

Difference between Work and heat:

1) Heat and work both are transient phenomen. system never pocess them but either both cross the system boundary whenever a syste undergoes change of state.

2) Both heat and work are (path) boundary phenomen both are observed only at the boundary and represent energy crossing the boundary.

3) Both and work are path function and only depend upon the path followed by a system.

(6)

Q# 3 (ii) Ans:

Actually the equation

$$\Delta Q = \Delta U$$

shows the specific heat at constant volume: and that is:

"The amount of heat required to raise the temperature of unit mass of a gas through one degree rise in temperature at constant volume."

It is denoted by 'Cv'

for air $C_v = 0.171$

c.h.u / 7log - K

Exp:

As volume is kept constant so:

(8)

$\Delta V = 0$

As:

$\Delta W = P\Delta V$

So:

$\Delta W = 0$

As from the first Law of thermodynamic:

$\Delta Q = \Delta \cancel{W}^{0} + \Delta U$

$$\boxed{\Delta Q = \Delta U}$$

As:

Q = Heat added to system

W = work done by system

ΔU = change in energy.

(8)

Q#4 Ans:

Throttling:

Def:

"This type of expansion occurs when a gas or vapous is expanded through an aperture of minute dimensions such as a narow throat or a slightly opened valve"

Explanation:

It should be noted that frictional resistance of a fluidion passing through a pipe varies inversely with the 7th power of the pipes diameter

$$\text{velocity} \propto \frac{1}{d^5}$$

During a throttling process no heat is supplied or

(10)

rejected, no external work is done and in the case of a perfect gas there is no alteration in the temperature Hence throttling is an expansion under conditions of constant total energy.

(10)